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TWO NEW FORMS OF STAGE MICROMETERS.

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As already stated in another paper read at this session, the writer prefers a stage micrometer ruled upon a metal surface to any other form, and never uses a glass stage micrometer. Inasmuch, however, as it is somewhat more convenient in ordinary work to use transmitted light, glass stage micrometers are almost universally employed. In the use of glass there are several difficulties: First, the unstable nature of the material and the danger of deterioration of the lines by use or otherwise, unless they are filled and protected by balsam and a cover glass in the ordinary manner of making balsam mounts. When filled with graphite and thus covered, the lines are durable; but ordinarily a filled line has not the clear, sharp outline of a good unfilled line; so that this method has its disadvantages. Micrometers with the lines ruled either on the glass slide or under side of the cover glass and mounted dry are very liable to "sweat." Various devices have been resorted to to prevent this; among others, that devised by Professor Rogers, of mounting the cover glass on the top of a metallic ring perforated for the purpose of allowing ventilation. While this usually accomplishes the purpose for which it was designed, micrometers thus mounted are in my experience very fragile, and not infrequently the ring becomes detached from its base. Very likely this can be prevented by the use of greater care by the possessor of such a scale.

In order to arrive at the desired result, the following device is proposed:

Figure 3 represents a view of the micrometer from above. "*a*" is a slide, 3″ x 1″, made of polished brass, either nickel-plated or oxidized, with a circular opening, with two or more wings "*d*" extending through the plate, as represented in the figure; "*b*" represents a cover glass, on the under side of which the scale is ruled.

Figure 4 represents a sectional view of the slide, with the cover glasses "*b*" and "*c*" resting on and cemented to shelves turned out of the periphery of the circular opening on each side of the slide. It will be observed that there is a clear space between the two cover glasses, and the wings or openings (*"d" "d,"* Fig. 3) may be made numerous enough to secure perfect ventilation. The lower cover glass need not be permanently cemented in place, but only temporarily fastened by bits of wax, so that it may be removed whenever necessary for the purpose of brushing off the dust from the under surface of the ruled cover in case it becomes necessary to do so. One advantage claimed for this form of mounting is that the ruled cover, by reason of its lying in a recess below the surface or, at most, flush with the surface of the slide, is not so likely to be displaced or broken by accidental violence. Another advantage is that the ventilation can be made perfect.

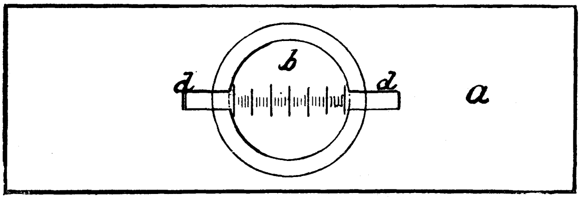

FIG. 3.

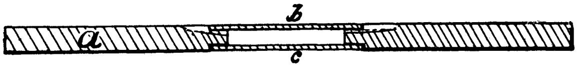

FIG. 4.

Another form of micrometer is the following: A plate-glass slide is first coated with a very thin film of pure silver. The one shown the Society was prepared for me by my esteemed friend, Mr. John A. Brashear, of Allegheny City, to whom I desire to express my obligation for many courtesies extended when in need of assistance to "help me out of some scientific corner."

The film is precisely the same as he uses on his excellent glass reflecting telescopes. It will be observed that it is so thin as to be translucent. Lines are ruled *through* this film of silver precisely as if it were a glass slide. The lines and film of silver are then protected by balsam and a cover glass in the ordinary manner. This form of micrometer possesses the advantages of both glass and metal micrometers. It can be used either with transmitted light or with an opaque illuminator and, with reasonable care, is indestructible. While the lines on an ordinary glass stage micrometer *can* be seen with an opaque illuminator, it is not easy to use one by reflected light, and their continual use is not recommended as conducive either to pleasure or piety. Lines ruled on metal, on the other hand, are by reflected light so clear and pleasant to use that, once familiar with them, no other form is desirable. I refer now only to the use of reflected light, which is usually used in making comparisons of lengths that are greater than the width of the field of the microscope. Of course, if the spaces of the scale to be used can be included within half of the field of the microscope (no more than which should ever be used in micrometry, and that only in the center of the field), transmitted light, as already stated, is more convenient and is employed by most workers.

In presenting this scale to the Society as a new form of micrometer I may state that I am acquainted with the use of the test plate manufactured by Zeiss, in which the lines are ruled through a thin film of metal; but I am not aware that such a device has ever before been used for micrometric purposes, and in the plate of Zeiss in my possession the lines are so ragged and the film so opaque as certainly to be unsuited for any such purpose.